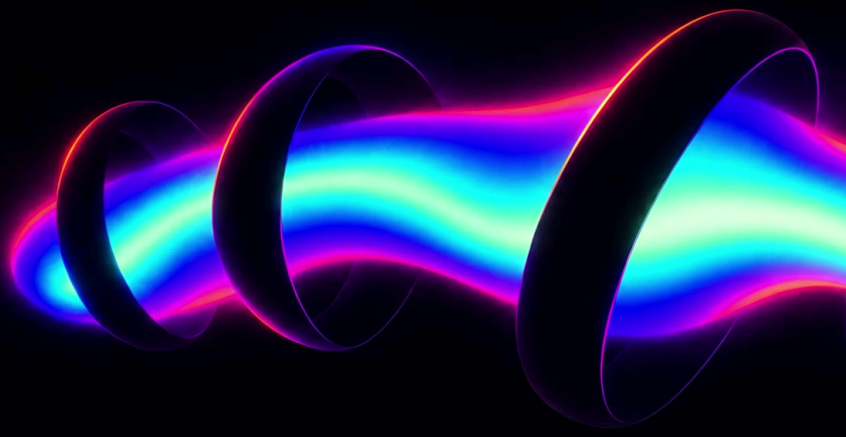
HIGH-TEMPERATURE SUPERCONDUCTING FIELD COIL

AR-1 Magnet Module

A 20 tesla field coil for compact fusion reactors, delivered wound, cooled and tested.



20 T	20 K	18	6 h
PEAK FIELD ON COIL	OPERATING TEMPERATURE	MODULES PER REACTOR	FULL-FIELD HOLD, AR-0

01

A smaller reactor

In a tokamak, fusion power density rises roughly with the fourth power of the magnetic field. A stronger field lets a smaller machine reach the same output.

02

Cooled with gas at 20 K

The tape stays superconducting at 20 K, so the module runs on helium gas instead of liquid helium at 4 K. The cryogenic plant is smaller and simpler.

03

Tested before it ships

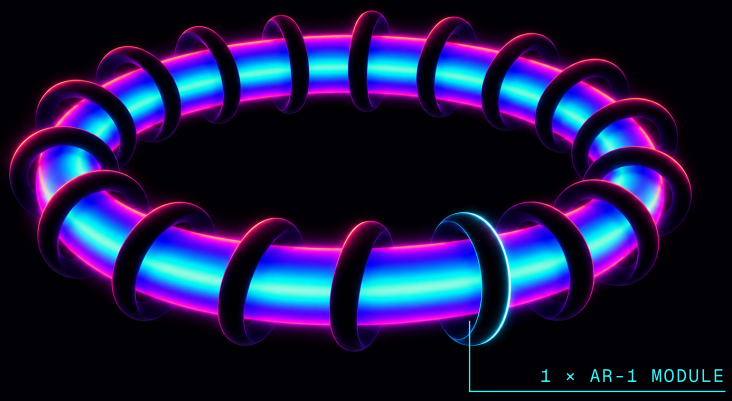
Every module is run to full field at our plant and arrives with its test record and standard interfaces, ready to mount.

04

Watched end to end

Voltage and temperature sensing runs along the full winding, so the coil can be monitored at every point in operation.

HOW IT WORKS



18 MODULES · ONE REACTOR

ILLUSTRATIVE, NOT TO SCALE

01

Current flows in the tape. At 20 K the REBCO tape carries 40 kA with no resistance.

02

The coil makes the field. Up to 20 T on the coil, about 12 T where the plasma sits.

03

The field holds the plasma. Eighteen modules ring the reactor and keep plasma at 100 million K off the walls.

Specifications

MAGNETIC

PARAMETER (UNIT)	VALUE
Peak field on coil (T)	20
Field on plasma axis (T)	12.2
Operating current (kA)	40
Stored energy per module (MJ)	110
Conductor	REBCO coated tape
Tape per module (km)	270

THERMAL AND COOLING

Operating temperature (K)	20
Coolant	Helium gas, forced flow
Heat load at 20 K (W)	< 30
Cool-down from 300 K (days)	4

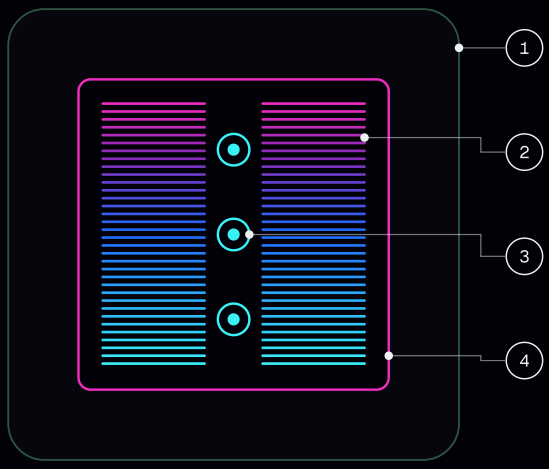
POWER AND MECHANICAL

Ramp to full field (h)	2
Power supply rating (kA / V)	45 / 20
Height × width × depth (m)	3.2 × 2.1 × 0.6
Mass (t)	10.5
Case	Stainless steel 316LN

LIFETIME

Design life (years)	20
Rated full-field cycles	10,000
Inspection interval (months)	24

SECTION A-A · ONE COIL LEG



01
Steel case
Holds the coil together against the magnetic forces.

02
REBCO tape stack
Superconducting tape, stacked in plates. Carries the current with no resistance.

03
Cooling channels
Helium gas flows through to hold the coil at 20 K.

04
Copper
Wraps the tape stack and protects it.

Cross-section of one coil leg · illustrative, not to scale

APPLICATION
Compact tokamaks
Eighteen modules form the toroidal field set. Delivered in the order you install them.

APPLICATION
Test facilities
Single modules for conductor research and cryogenic test stands.

ORDERING
Evaluation first
One module run to full field and shipped with its record in about nine months, then one a month.

ARDENT

Sales and partnerships
partners@ardent.example · Eindhoven, the Netherlands

MEET US

Power Futures Expo, Amsterdam
3 to 5 March 2027

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